

**North Ecology
35555 Kenai Spur Highway #380
Soldotna, Alaska 99669
907-343-9720**

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To: Heather Kendall-Miller
Native American Rights Fund

From: Phil North
Ecologist

Below is a review of the Chuitna Coal Project Draft Wetland and Waterbody Functional Assessment (hereafter referred to as the Assessment) conducted on behalf of the Native Village of Tyonek. The Assessment was prepared for PacRim Coal LP by HDR Alaska and dated September 2013. It describes the functions that wetlands and other types of fresh waters perform in the area of the Chuitna Coal Project. General comments addressing the conceptual framework of the assessment are listed first, followed by specific comments on the content of each section. Recommendations for improving the Assessment are included throughout.

General Comments

Assessment Method

The purpose of a wetland functional assessment is to inform the development of a strategy to mitigate the loss of wetlands and other waterbodies (to simplify writing, “wetlands and waterbodies” will be addressed simply as wetlands). As noted in the Assessment every wetland assessment method has limitations. Methods were originally developed in the lower 48 states to address losses in highly modified landscapes where the aerial extent and function of wetlands was greatly diminished, as was overall ecosystem function of the surrounding landscape. Most methods identified individual functions then quantified the degree of function so that loss could be quantitatively mitigated. This approach is focused on individual wetland functions but not the overall ecosystem.

The Assessment by PacRim continues in this tradition in that it identifies wetland functions, then individually assesses them. It differs from most methods in that it evaluates wetland function qualitatively then uses presence/absence in the final description of a function. The final description of potential wetland functional loss is an assignment of presence or absence based on occurrence above a threshold. This approach is appropriate for a site such as the Chuitna Coal Project where there is insufficient data to develop quantitative wetland models and assignments of function are based primarily on professional judgment.

However, like other methods, this approach is reductive. It fails to consider that wetlands are part of an ecosystem that occupies a landscape. The results of such assessments are often used to replace function in a piece-meal fashion. An example of such a piece-meal approach is the PacRim proposal to mitigate lost salmon habitat by building ponds in which to rear coho salmon. A particular function may be replaced, but the rest of the ecosystem and the values and services it provides are lost.

Such a reductive approach may be appropriate for identifying mitigation needs for projects that affect specific remaining functions on a highly disturbed landscape or for small projects that, because of their scale, affect limited functions. For example a building pad may result in increased storm water runoff and loss of wildlife habitat on site. It might be mitigated on site or at another site nearby to account for loss of those functions in the same ecosystem. But for a project covering thousands of acres that will significantly alter all aspects of an ecosystem at the site, an approach that takes into account the entire ecosystem is more useful.

Mitigation based on a wetlands assessment may not be appropriate on large projects that significantly alters a large area of landscape. Mitigation in such circumstances may be better based on the overall loss of the wetlands ecosystem quantified by aerial extent.

Specific Comments

3.0 Methods

If we put aside the above comments on ecosystem level loss, the methods applied are generally reasonable for the Chuitna Coal Project. They recognize that wetlands in the Chuitna system are not disturbed and therefore would all be considered to be “reference wetlands” in other wetland assessment methodologies – highly functioning wetlands against which to quantify the function of other wetlands. Instead this method applies a presence/absence system of addressing loss of wetland functions. If the function is present above a threshold then it is considered to be present, otherwise it is considered to be absent, or not worth considering in mitigation.

While the overall approach is acceptable, the method will result in a failure to mitigate wetland functions that exist but are below the threshold. Even “low” functioning wetlands provide values or services and should be considered in mitigation.

3.5.1 Habitat for Bird Species of Conservation Concern (BSCC)

It is not clear how or why a threshold value of greater than or equal to 25 percent of BSCC was developed. Low and moderate value habitat could be important for each of these bird species. In the event of a landscape scale disturbance, such as fire, low value wetlands could be the refugia from which recovering areas are colonized. Consideration should be given to assigning this function to all wetlands that are judged to have habitat for any BSCC.

3.5.2 Wildlife Species Richness

The approach used here is reasonable. However, it is not clear why the cut-off value for habitat was set at moderate for wildlife richness, while it was set at low for BSCC. This appears arbitrary. The rationale for this should be explained or the threshold should be changed so that low value habitat is included and only habitat of negligible performance is excluded.

3.5.3 Essential Habitat for One or More Wildlife Species

The approach used for this function is reasonable. However, another similar function should address habitat for key wildlife species. These species may be important for subsistence reasons or they may be ecological keystone species. While we recognize that values, such as subsistence and hunting will be addressed in the Supplemental Draft Environmental Impact Statement, habitat for key species relates to the habitat function of wetlands for these species rather than to their value to humans. This new function should be structured so that all habitat that supports the species is identified.

3.5.4 Anadromous Fish Habitat

The definition of this function explicitly excludes wetlands that provide a supporting role for anadromous fish habitat. It ignores the importance of headwater streams to the ecological integrity of down stream waters. Headwater streams provide flow stability, nutrient processing, organic matter and other functions that are critical to the ecological stability of downstream waters (see Nadeau and Rains 2007). These waters should be included in the anadromous fish habitat function or a separate fish habitat support function should be developed. The aerial extent of this function should include upstream waters that may be isolated by mining or groundwater drawdown.

It is also important that this function include waters that may be isolated from upstream or lateral waters on the surface but may be connected subsurface. For example streams in peatlands will often flow through “pipes” of peat. Fish can travel through these “pipes” to reach upstream waters that are exposed at the surface. While this phenomenon likely occurs extensively where streams flow through peatlands, we are aware of tributary streams on Stariski Creek and small ponds tributary to the Port Graham River on the Kenai Peninsula, where anadromous fish exist above reaches where the stream flows subsurface through peat “pipes”. The upstream waters on Stariski Creek were added to the Alaska Anadromous Waters Catalogue after this discovery.

Fish swimming through peat “pipes” may also explain the “isolated coho” found in ponds in the Chuitna Coal Project area. These salmon should not be considered to be isolated unless there is evidence other than lack of surface water connection supporting that conclusion.

3.5.5 Resident Fish Habitat

Comments on the Anadromous Fish Habitat Function apply here.

3.5.7 Floodflow Moderation

The 2008 draft of the Assessment contained a floodflow moderation function that was too restrictive. It did not include all wetlands that performed this function. However, with the addition of a Surface and Subsurface Water Storage function to the 2013 draft, the combined functions are acceptable for addressing the flood moderation function of wetlands.

The rationale for this function does not explain the use of a 2.5 foot horizontal buffer to define the floodprone area of steep streams and streams less than 1.5 feet wide. “E” streams in the Rosgen classification system may be narrow and typically traverse very gently sloping ground. These streams may flood well beyond 2.5 feet from the channel. The use of twice the thalweg depth is appropriate for defining floodprone area on these streams.

3.5.10 Ground Water Discharge and Recharge

The third paragraph of the rationale states that upland sites are expected to recharge groundwater at a much higher rate than wetlands. This is not always true as shown by recent research in Southwestern Alaska. In a glacially developed landscape such as at the Chuitna Coal Project area wetlands were shown to have up to 300% the groundwater recharge rates as uplands (see Rains 2011). Wetlands throughout the watershed may play a significant role in groundwater recharge. This should be clarified.

The Assessment should ensure that the groundwater model was properly verified in addition to calibrated to ensure that the model used to determine the extent of groundwater discharge and recharge is fully vetted.

We recommend that the authors of the Assessment evaluate the use of the flow-weighted-slope (FWS) method used recently on Kenai Peninsula wetlands studies (see Walker et al., 2012; King et al., 2012; Callahan et al., In review, contact Walker at Kachemak Bay Research Reserve for possible access to manuscript or expected date of publication). FWS accounts for the catchment wetness, topography, and the slope of the flow path, particularly as flow paths approach valley bottoms and streams. It proved useful in describing the hydrologic relationship between wetlands and streams on the Kenai Peninsula. It may better predict which wetlands are likely to act as groundwater discharge sites.

3.5.11 Carbon Export

The rationale for this function is reasonable, except that it should clarify that while a surface connection to a stream is necessary for carbon export, the flow need not be continuous. Flow to the stream may be intermittent and provide a means for a wetland to perform this function.

3.5.12 Sediment and Toxicant Retention

The Opportunity Indicators are limited to wetlands in the floodprone area and wetlands within 30 feet of existing exposed fill or clearings. These criteria are too restrictive to reflect the performance of this function by wetlands at the Chuitna Coal Project. As a mine progressively clears land nearby wetlands will be in a position to accept contaminated water or dust and retain sediment and toxicants. The mine plan can be used to determine the wetlands to which this function should be attributed over time. As mining progresses this function will be important and should be fully assessed spatially and temporally.

3.3.13 Nutrient Retention

Nitrogen compounds that are residue from blasting may contaminate downstream waters through runoff and wind blown dust and should be accounted for in this function. In the same manner as the Sediment and Toxicant Retention function, this function should include wetlands that have the opportunity to retain runoff or dust over the course of mining.

Table 14, footnote b.

There is no superscript “b” in this table so this footnote should be removed. However, all affected wetlands should be included in this analysis, including those within the groundwater drawdown area and those that are isolated by mining.

Additional Scientific Literature to Consider

All but one of the publications listed below contain results of research on nearby wetlands. We recommend that they be reviewed and the results be considered for incorporated into this assessment.

Callahan, M.K., M.C. Rains, J.C. Bellino, C.M. Walker, and S.J. Baird. In Review. Trends and controls in surface-water temperatures in headwater streams, Kenai Peninsula, Alaska. *Journal of the American Water Resources Association*.

King, R.S., C.M. Walker, D.F. Whigham, S.J. Baird, and J.A. Back, 2012. Catchment Topography and Wetland Geomorphology Drive Macroinvertebrate Community Structure and Juvenile Salmonid Distributions in South-Central Alaska Headwater Streams. *Freshwater Science*. 31:341-364.

Nadeau, T.L. and M. C. Rains. 2007. Hydrologic connectivity between headwater streams and downstream waters: how science can inform policy. *Journal of the American Water Resources Association*. Vol 43, No 1:118-132.

Rains, M.C. 2011. Water sources and hydrodynamics of closed-basin depressions, Cook Inlet Region, Alaska. *Wetlands* 31: 377–387.

Walker, C., R.S. King, D.F. Whigham, and S.J. Baird, 2012. Landscape and Wetland Influences on Headwater Stream Chemistry in the Kenai Lowlands, Alaska. *Wetlands*. 32:301-310.